Review Protocol

Design guidelines for IVR-based SGs for ASD rehabilitation

# Team Information

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| **Project Lead** | FC |
| **Research Team Members** | FC, TDM, SP, MCP, VSB |
| **Date** | 05/04/2021 |
| **Institution(s)** | [Anonimized] |

# Review Research Question

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| **Full Review Questions**  *Provide the full review question in sentence format* |
| * Is the team involved in developing immersive virtual reality-based serious games for autism homogeneous or heterogeneous? * Which design methodologies are adopted for developing immersive virtual reality-based serious games for autism? * What design frameworks are used to design immersive virtual reality-based serious games for autism? |

# Search Strategy

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| **Search String**  *Provide the full search string adopted for searching on digital resources* |
| *("autism spectrum disorder" OR “autism” OR "ASD") AND ("immersive virtual reality" OR "immersive virtual environment" OR "virtual reality" OR "HMD" OR "CAVE") AND ("serious game" OR "educational game")* |
| **Digital Resources**  *List the bibliographic databases to be searched.* |
| 1. Scopus[[1]](#footnote-1), 2. ACM digital library[[2]](#footnote-2), 3. IEEE Xplore Digital Library[[3]](#footnote-3), 4. Science Direct[[4]](#footnote-4), 5. Web of Science[[5]](#footnote-5), 6. PubMed[[6]](#footnote-6), 7. Semantic Scholar[[7]](#footnote-7), 8. Google Scholar[[8]](#footnote-8). |
| **Hand Searching**  *List journals or websites that will be hand searched for relevant articles.* |
| 1. International Journal of Human-Computer Interaction 2. International Journal of Child-Computer Interaction 3. Journal of Computer Assisted Learning 4. Interactive Learning Environments 5. Journal of Enabling Technologies 6. IEEE Access 7. IEEE Transactions on Learning Technologies 8. ACM Transactions on Accessible Computing (TACCESS) 9. Computers in Human Behavior 10. Autism Research 11. Journal of Autism and Developmental Disorders 12. Review Journal of Autism and Developmental Disorders |
| **Reference Searches**  *If forward or backward citations will be performed (also known as chain or snowball searching), detail them here.* |
| The reference lists of following reviews have been scanned:   1. Nordhal-Hansen et al., 2020 2. Dechsling et al., 2021 3. Zhang et al., 2022 4. Karami et al., 2021 5. Lorenzo et al., 2019 6. Mak and Zhao et al., 2020 7. Miller and Bugnariu et al., 2016 8. Bellani et al., 2011 9. Glaser and Schmidt, 2021 10. Bradley and Newbutt, 2018 11. Parsons and Cobb, 2011 12. Bozgeyikli et al., 2018 13. Mesa-Gresa et al., 2018 14. Thai and Nathan-Roberts, 2018 15. Tang et al., 2019 16. Kellidou et al., 2020 17. Grossard et al., 2017 18. Camargo et al., 2019 19. Valencia et al., 2019 20. Hassan et al., 2021 21. Noor et al., 2014 22. Tsikinas and Xinogalos, 2018 23. Zakari et al., 2014 |

# Inclusion Factors

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| **IN1** | Research articles published between January 2009 and July 2021 |
| **IN2** | Research articles written in English |
| **IN3** | Research articles published on peer-reviewed journals or conference proceedings |
| **IN4** | Research articles having the full text available (not only title and abstract) |
| **IN5** | Research articles focusing on the rehabilitation of individuals with ASD |
| **IN6** | Research articles dealing with IVR-based SG rehabilitative interventions |
| **IN7** | Research articles reporting the description of the design and development of IVR-based SG rehabilitative interventions |

# Exclusion Factors

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| **EX1** | Research articles published before 2009 |
| **EX2** | Research articles that are not written in English (e.g., Chinese) |
| **EX3** | Research articles of the following types: surveys, reviews, systematic reviews, meta-analyses, editorials, term papers, dissertations, theses, technical reports, student reports, posters, and unpublished works. |
| **EX4** | Research articles that have duplicates |
| **EX5** | Research articles whose full text is not available neither obtained after a precise request to authors |
| **EX6** | Research articles that do not deal with the topics of the systematic review (e.g., learning environment for nurses education) |
| **EX7** | Research articles focusing on other health conditions (e.g.,motor disabilities) or mental disorders (e.g.,dementia) |
| **EX8** | Research articles presenting interventions for ASD caregivers (e.g., parents and therapists), and not for individuals with ASD |
| **EX9** | Research articles with a different purpose than rehabilitation (e.g., diagnosis) |
| **EX10** | Research articles presenting interventions do not realized with SG |
| **EX11** | Research articles presenting interventions do not realized with IVR (e.g., robots) |
| **EX12** | Research articles that do not describe the design and development of IVR-based SG rehabilitative interventions |

# Data Extraction

*Provide a description of methods used to collect data from included studies (e.g. categories of data you intend to collect, how many people will conduct extraction, how disagreements will be resolved, etc).*

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| Data extraction forms have been designed to accurately record the information needed to address the identified review question extracted from the selected research articles. The forms have been realized through electronic sheets.  The contents of the data extraction forms used in the current systematic review, including also standard general data about the research articles, are listed below:   * Title * Year of Publication * Authors’ list * Contribution type (i.e., Journal/Conference) * Source title (i.e., name of the journal or conference proceedings) * Name of the project or of the proposed intervention * Design Methodology/Approach * People involved in the development process (e.g., ICT experts, psycho-pedagogical experts, ASD practitioners, people with ASD, families of people with ASD * Serious Game design framework   The data extraction has been performed independently by all the experts conducting the present systematic review. The extracted data have then been compared and disagreements have been resolved by consensus among researchers, obtaining a single electronic sheet for each selected research article. |

# Study Quality Assessment

*If applicable, describe the tool(s) you will use to assess risk of bias.*

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| TBD |

# Data Synthesis

*Describe how you will analyze and summarize the included study results.*

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| All the data extracted from selected research articles will be analyzed by descriptive analysis (frequency analysis, mean, average) |

# Research Team Member Roles

*Describe the different tasks on the review and who will be responsible for what.*

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| Task | Description | Team Member Responsible |
| STAGE 1 | Search on selected digital libraries | FC |
| STAGE 2 | Filtering of Results obtained by searching on selected digital libraries | FC |
| STAGE 3 | Building of electronic sheets including all search results + Semi-automatic filtering of obtained research articles (EX1, EX2, EX3) | FC |
| STAGE 4 | Analysis of title, abstracts, conclusions, and figures of research articles | SP, TDM, FC, MCP |
| STAGE 5 | Analysis of full text of research articles | SP, TDM, FC, MCP |
| STAGE 6 | Additional manual searching to identify supplementary research articles dealing with studies presented in included research articles | FC |
| Study Quality Assessment | Assessment of the study quality | SP, TDM, FC, MCP |
| Data Extraction | Extraction of the meaningful data from included research articles | SP, TDM, FC, MCP |
| Data Synthesis | Analysis and synthesis of the extracted data from included research articles | SP, TDM, FC, MCP |

# References

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| Kitchenham, B. (2007). Procedures for performing systematic reviews. *Keele, UK, Keele University*, *33*(2007), 1-26. |

1. https://www.scopus.com [↑](#footnote-ref-1)
2. https://dl.acm.org [↑](#footnote-ref-2)
3. https://ieeexplore.ieee.org [↑](#footnote-ref-3)
4. https://www.sciencedirect.com [↑](#footnote-ref-4)
5. http://apps.webofknowledge.com [↑](#footnote-ref-5)
6. https://pubmed.ncbi.nlm.nih.gov [↑](#footnote-ref-6)
7. https://www.semanticscholar.org [↑](#footnote-ref-7)
8. https://scholar.google.com [↑](#footnote-ref-8)